



ECH 430

Teaching and Learning Science and Technology

S2 External 2017

Department of Educational Studies

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General Information

Unit convenor and teaching staff

Unit Convenor & Lecturer

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By email appointment

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Credit points

3

Prerequisites

ECH335 or ECHE234

Corequisites

Co-badged status

Unit description

This unit builds on the knowledge gained in previous units, further developing student's knowledge of the principles and practices of teaching and learning science and technology. Students explore a range of strategies for assessing children's scientific understandings, and use knowledge of curricula, resources and teaching strategies to design and implement lesson sequences to enhance the growth of children's scientific thinking. Students examine information and communication technology as a tool for learning and explore issues related to the use of technology in the classroom. The integration of science and technology into other learning areas and differentiating curriculums to meet the diverse needs of learners are also addressed.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

Learning Outcomes

On successful completion of this unit, you will be able to:

Develop further understanding of the major theoretical and research directions and current resources in science education.

Design lesson sequences and units of work that enhance the growth of children's scientific thinking, reflects current issues in research and integrates other curriculum areas.

Demonstrate knowledge of scientific concepts, processes and resources related to the made environment in the contexts of physical phenomena, information, and products.

Demonstrate research based knowledge of teaching and learning approaches to differentiating curriculum to meet the diverse needs of learners in the science classroom.

Demonstrate effective science teaching and learning strategies for meeting the needs of indigenous students.

Integrate information and communication technologies (ICT) and critical evaluation of resources within effective teaching and learning strategies to expand opportunities for professional learning and scientific thinking.

Assessment Tasks

Name	Weighting	Hurdle	Due
<u>Plan for ICT Resource</u>	30%	No	6/10/17
<u>Rubric & Reflection</u>	10%	No	25/26 Sept & Week 13
<u>Interactive ICT Resource</u>	60%	No	13/11/17

Plan for ICT Resource

Due: **6/10/17**

Weighting: **30%**

Design and produce a PLAN for an innovative, interactive ICT resource to engage and inform pre-school/school children/students with online and offline activities related to concepts in the K-6 Science and Technology Physical World strand.

Use the 5E teaching approach as a framework, focus on the processes of Working Scientifically and Working Technologically, and incorporate at least one cross-curriculum priority:

- Aboriginal and Torres Strait Islander histories and cultures,
- Asia and Australia's engagement with Asia,

- Sustainability.

Appropriate play-based pedagogies may be incorporated. Clear evidence of the following should be included: cross-curriculum priority area, differentiation for learner needs including indigenous students in science classrooms, appropriate assessment strategies related to concepts in the K-6 Physical World strand.

On successful completion you will be able to:

- Develop further understanding of the major theoretical and research directions and current resources in science education.
- Design lesson sequences and units of work that enhance the growth of children's scientific thinking, reflects current issues in research and integrates other curriculum areas.
- Demonstrate knowledge of scientific concepts, processes and resources related to the made environment in the contexts of physical phenomena, information, and products.
- Demonstrate research based knowledge of teaching and learning approaches to differentiating curriculum to meet the diverse needs of learners in the science classroom.
- Demonstrate effective science teaching and learning strategies for meeting the needs of indigenous students.
- Integrate information and communication technologies (ICT) and critical evaluation of resources within effective teaching and learning strategies to expand opportunities for professional learning and scientific thinking.

Rubric & Reflection

Due: **25/26 Sept & Week 13**

Weighting: **10%**

Pre-service teachers will actively participate in the development of the Unit Marking Rubric (Week 1) and reflect on their personal learning journey (Week 13).

On successful completion you will be able to:

- Develop further understanding of the major theoretical and research directions and current resources in science education.
- Demonstrate knowledge of scientific concepts, processes and resources related to the made environment in the contexts of physical phenomena, information, and products.
- Demonstrate research based knowledge of teaching and learning approaches to differentiating curriculum to meet the diverse needs of learners in the science classroom.
- Integrate information and communication technologies (ICT) and critical evaluation of resources within effective teaching and learning strategies to expand opportunities for

professional learning and scientific thinking.

Interactive ICT Resource

Due: 13/11/17

Weighting: 60%

Using feedback from Assessment Task 2, design and produce an innovative, interactive ICT resource to engage and inform pre-school/school children/students with online and offline activities related to concepts in the K-6 Science and Technology Physical World strand.

Use the 5E teaching approach as a framework, focus on the processes of Working Scientifically and Working Technologically, and incorporate at least one cross-curriculum priority:

- Aboriginal and Torres Strait Islander histories and cultures,
- Asia and Australia's engagement with Asia,
- Sustainability.

Appropriate play-based pedagogies may be incorporated. Clear evidence of the following should be included: cross-curriculum priority area, differentiation for learner needs including indigenous students in science classrooms, appropriate assessment strategies related to concepts in the K-6 Physical World strand.

On successful completion you will be able to:

- Develop further understanding of the major theoretical and research directions and current resources in science education.
- Design lesson sequences and units of work that enhance the growth of children's scientific thinking, reflects current issues in research and integrates other curriculum areas.
- Demonstrate knowledge of scientific concepts, processes and resources related to the made environment in the contexts of physical phenomena, information, and products.
- Demonstrate research based knowledge of teaching and learning approaches to differentiating curriculum to meet the diverse needs of learners in the science classroom.
- Demonstrate effective science teaching and learning strategies for meeting the needs of indigenous students.
- Integrate information and communication technologies (ICT) and critical evaluation of resources within effective teaching and learning strategies to expand opportunities for professional learning and scientific thinking.

Delivery and Resources

Each week's lectures will be available via ILearn for all students and will be available from at least 9:00pm on the preceding Sunday evening.

Both **Internal and External students** are to access lectures and tutorial materials via ILearn.

Compulsory On-Campus Session for ECH 430 External Students

There are two **compulsory** On-Campus Sessions for ECH 430 external students. Failure to attend all or part of the sessions will result in automatic exclusion from the unit. The On-Campus sessions will be held on the **25th and 26th of September 9.00am-5.00pm.**

Resources

This unit requires students to access online journals and research materials through the Macquarie University Library website. There are no set texts for this unit. Weekly readings are detailed in the Unit Outline schedule, and where possible, will be available via iLearn.

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](#). Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy_2016.html

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Complaint Management Procedure for Students and Members of the Public http://www.mq.edu.au/policy/docs/complaint_management/procedure.html

Disruption to Studies Policy (in effect until Dec 4th, 2017): http://www.mq.edu.au/policy/docs/disruption_studies/policy.html

Special Consideration Policy (in effect from Dec 4th, 2017): <https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policies/special-consideration>

In addition, a number of other policies can be found in the [Learning and Teaching Category](#) of Policy Central.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/support/student_conduct/

Results

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit ask.mq.edu.au.

Student Support

Macquarie University provides a range of support services for students. For details, visit <http://stu>

[dents.mq.edu.au/support/](https://unitguides.mq.edu.au/support/)

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcome

- Design lesson sequences and units of work that enhance the growth of children's scientific thinking, reflects current issues in research and integrates other curriculum areas.

Assessment tasks

- Plan for ICT Resource
- Interactive ICT Resource

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

Learning outcome

- Develop further understanding of the major theoretical and research directions and current resources in science education.

Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

Learning outcome

- Integrate information and communication technologies (ICT) and critical evaluation of resources within effective teaching and learning strategies to expand opportunities for professional learning and scientific thinking.

Assessment tasks

- Plan for ICT Resource
- Rubric & Reflection
- Interactive ICT Resource

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- Develop further understanding of the major theoretical and research directions and current resources in science education.
- Design lesson sequences and units of work that enhance the growth of children's scientific thinking, reflects current issues in research and integrates other curriculum areas.
- Demonstrate knowledge of scientific concepts, processes and resources related to the made environment in the contexts of physical phenomena, information, and products.
- Demonstrate research based knowledge of teaching and learning approaches to differentiating curriculum to meet the diverse needs of learners in the science classroom.
- Integrate information and communication technologies (ICT) and critical evaluation of resources within effective teaching and learning strategies to expand opportunities for professional learning and scientific thinking.

Assessment tasks

- Plan for ICT Resource
- Rubric & Reflection
- Interactive ICT Resource

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- Design lesson sequences and units of work that enhance the growth of children's scientific thinking, reflects current issues in research and integrates other curriculum areas.
- Integrate information and communication technologies (ICT) and critical evaluation of resources within effective teaching and learning strategies to expand opportunities for professional learning and scientific thinking.

Assessment tasks

- Plan for ICT Resource
- Rubric & Reflection

- Interactive ICT Resource

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- Demonstrate research based knowledge of teaching and learning approaches to differentiating curriculum to meet the diverse needs of learners in the science classroom.
- Demonstrate effective science teaching and learning strategies for meeting the needs of indigenous students.
- Integrate information and communication technologies (ICT) and critical evaluation of resources within effective teaching and learning strategies to expand opportunities for professional learning and scientific thinking.

Assessment tasks

- Plan for ICT Resource
- Rubric & Reflection
- Interactive ICT Resource

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes

- Design lesson sequences and units of work that enhance the growth of children's scientific thinking, reflects current issues in research and integrates other curriculum areas.
- Demonstrate knowledge of scientific concepts, processes and resources related to the made environment in the contexts of physical phenomena, information, and products.
- Integrate information and communication technologies (ICT) and critical evaluation of

resources within effective teaching and learning strategies to expand opportunities for professional learning and scientific thinking.

Assessment tasks

- Plan for ICT Resource
- Rubric & Reflection
- Interactive ICT Resource

Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

Learning outcome

- Demonstrate effective science teaching and learning strategies for meeting the needs of indigenous students.

Assessment task

- Interactive ICT Resource

Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

Learning outcome

- Demonstrate effective science teaching and learning strategies for meeting the needs of indigenous students.

Assessment task

- Interactive ICT Resource

Changes since First Published

Date	Description
23/07/ 2017	The Unit Schedule has been changed. The new Unit Schedule is available through the current Unit Outline in iLearn.